ABSTRACT

5G communication has characteristics of high data rates (10 Gbps uplink and 20 Gbps downlink), so that 5G needs the big channel capacity. To achieve that characteristics, 5G is applying the Multiple Input Multiple Output (MIMO) antenna system that able to increase channel capacity. The increase of channel capacity is influenced by several kind of things, such as mutual coupling. Therefore, many methods are done to decrease the mutual coupling effect. Polarization arrangement is one of the mothods in decreasing the mutual coupling.

This study designed a circular patch MIMO antenna with Epoxy (FR-4) substrate with ε_r = 4.3 at a 3.5 GHz frequency for Band 42 (3.4 to 3.6 GHz) and Band 43 (3.6 to 3.8 GHz) uses the truncated edge and coaxial probe methods to obtain Right Hand Circular Polarization (RHCP) and Left Hand Circular Polarization (LHCP). Then the four elements of the MIMO antenna are arranged with the Co-Polarization and Cross-Polarization configuration. Furthermore, an estimation of channel capacity is carried out in both configurations by calculating the number of spectral efficiency.

The results showed that the polarization arrangement in plane formation MIMO with Cross-Polarization is able to reduce the mutual coupling. S_{21} is reduced from the value of -17,6676 dB that done by the Co-Polarization to -22,462 dB with the Cross-Polarization in the same element distance. The result of spectral efficiency result for MIMO antennas that have been simulated, it has 4,804 bps/Hz in 5 dB SNR for Cross-Polarization, and about 4,833 bps/Hz in the same SNR for Co-Polarization. Meanwhile, at 20 dB SNR, the result of spectral efficiency is 18,065 bps/Hz for Cross-Polarization MIMO antenna, and 18,078 bps/Hz for *Co-Polarization* MIMO antenna.

Keywords: Circular Polarization, MIMO, Mutual Coupling, Co-Polarization, Cross-Polarization, Spectral Efficiency.